## (19) World Intellectual Property Organization

International Bureau



## . HADDA CUMBON DI OMAKO MAN OTAN OTAN BANDI CAMI KI IN DALAH KODIN MATA KIMI KIDAN KICA CAMAD KICA DINI OTAN

(43) International Publication Date 1 September 2005 (01.09.2005)

PCT

## (10) International Publication Number WO 2005/081372 A3

(51) International Patent Classification<sup>7</sup>: H01S 3/00, G02B 3/00, H05G 2/00

G03F 7/20,

(21) International Application Number:

PCT/GB2005/000608

(22) International Filing Date: 21 February 2005 (21.02.2005)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

0403865.9

20 February 2004 (20.02.2004) GB

(71) Applicant (for all designated States except US): POWER-LASE LTD [GB/GB]; Imperial House, Link 10, Napier Way, Crawley, West Sussex RM10 9RA (GB).

(72) Inventors; and

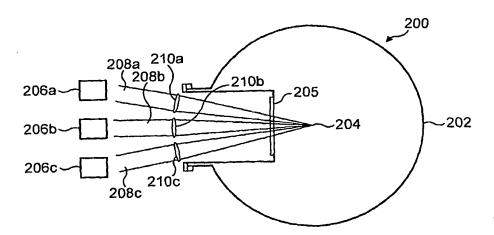
(75) Inventors/Applicants (for US only): COMLEY, Andrew, James [GB/GB]; Imperial House, Link 10, Napier Way, Crawley, West Sussex RM10 9RA (GB). ELLWI, Samir, Shakir [GB/GB]; Imperial House, Link 10, Napier

Way, Crawley, West Sussex RH10 9RA (GB). HAY, Nick [GB/GB]; Imperial House, Link 10, Napier Way, Crawley, West Sussex RH10 9RA (GB). HENRY, Matthew [GB/GB]; Imperial House, Link 10, Napier Way, Crawley, West Sussex RH10 9RA (GB).

- (74) Agents: ASHMEAD, Richard, John et al.; Kilburn & Strode, 20 Red Lion Street, London WC1R 4PJ (GB).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO,

[Continued on next page]

(54) Title: LASER MULTIPLEXING



(57) Abstract: A laser multiplexing system and method for use with high power pulsed lasers in Extreme Ultraviolet Lithography i.e. EUL. In a first embodiment, a high power EUV laser multiplexing element (200) for laser produced plasma generation comprises a compound lens comprising at least two focusing elements (210) arranged to focus at least two respective laser beams (208) to a focal point (204) on a common workpiece. In a second embodiment, a laser multiplexing apparatus comprises at least two pulsed laser sources for generating pulsed laser beams and a temporal multiplexing element (302) arranged to temporally interleave at least two pulsed laser beams (300). In a third embodiment, laser multiplexing assembly comprises a beam shaping element (401) in which the beam shaping element is arranged to direct a first laser beam (406a) along an axis common with a second laser beam (406b) axis onto a common focusing element (405) arranges about said common axis.



O 2005/081372 A3 ||||||||||||



SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments
- (88) Date of publication of the international search report: 8 December 2005

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.